FINAL TECHNICAL REPORT
NEHRP/USGS AWARD NUMBERS: 08HQGR0028

January 1, 2008 – April 30, 2009

Rapid Estimation of Large Earthquake Duration, Radiated Energy and Tsunami Earthquake Potential

Principal Investigator: Andrew V. Newman
School of Earth and Atmospheric Sciences
Georgia Institute of Technology
311 Ferst Drive
Atlanta, GA 30332
TEL: 404-894-3976
FAX: 404-894-5638
EMAIL: anewman@gatech.edu

Submitted: July 28, 2009

Abstract:

Recently several very large and great earthquakes have occurred globally, testing the upper limits of our current methods for rapidly assessing earthquake size, generally with only moderate success. Thus, because rapid assessment of earthquake size is important for hazard mitigation from both strong shaking and potential tsunami generation, the U.S. Geological Survey's Earthquake Hazards Program has identified the issue and is currently calling for projects that "develop practical methods for rapid source characterization for major earthquakes, including magnitude determination, source finiteness, and slip distribution,... Research on accurate early magnitude/ moment/energy determinations is encouraged." [*NEHRP*, 2008]. Because of this, we were funded to extend the rapid radiated energy algorithms of *Newman and Okal* [1998 to assess the approximate rupture duration, T_r, radiated high-frequency, E_{hf}, and broad-spectrum energy, E_{bb}, and energy magnitudes, M_e, of the largest observed earthquakes. Along with being useful for rapidly assessing the temporal extent of rupture, this methodology can be used to rapidly assess a unique "slow-source" character that has been observed in past "tsunami earthquakes".

Using real-time vertical-component broadband teleseismic data retrieved from the USGS National Earthquake Information Center (NEIC) we developed methodologies to calculate the cumulative growth of energy rapidly upon determination of an earthquake. We used the cessation of significant energy growth to determine an approximate assessment of event duration, and identified some new slow character events (though too small to create tsunami). Through this funding, we now have an automated set of algorithms that are systematically attempting to perform energy calculations for all earthquakes detected with an initial reported magnitude of 5.5. At the time of this writing (July, 2009) 277 events have been automatically processed since 1/1/09. Results are informative, yielding insight into the relative robustness of the code nearly 2-orders of magnitude below its original planned threshold of M 7.5. Likewise, though precise knowledge of the event depth and focal solution is necessary for precision results, real-time averaging usually provides accurate results even for many of the smallest events tested. While results are considerably noisier at this lowest threshold, much can be learned from consistent and continued energy calculations for global events here. Here we report the results from the newly adapted codes for ongoing measurement of global seismicity in real-time. Because no M 8+ events occurred during the deployment of the current methodologies, we also report on 'real-time' post-processed results for the Wenchuan earthquake from May of 2008.

I) Significance of the project

This project focused on the development of algorithms for the real-time determination of earthquake energy and duration for the largest global earthquakes (M>7.5). The project focused on the development of a methodology that requires only the early P-wave group arrivals at teleseismic distances to estimate the high-frequency earthquake energy growth and ultimate energy magnitude, M_e. This methodology does not saturate, even for the largest observed events. Due to this early detection capability, useful event parameters can be provided rapidly after an event is known for damage mitigation, and tsunami warnings. Other than teleseismic waveform data, only the approximate location is necessary for these algorithms to work, which can already be readily achieved from first motions. By implementing the methods developed here into the NEIC and US tsunami warning centers we will enhance the US capability to rapidly assess rapidly assess the size, and better understand the tsunami potential within minutes of a major event, and thus be useful for rapid post-event mitigation.

One of the *National Priorities* stated within the *NEHRP* [2008] RFP is for projects that: "*Develop practical methods for rapid source characterization for major earthquakes, including robust magnitude determination, source finiteness, and slip distribution that can be readily implemented and integrated into NEIC operations. Research on accurate early magnitude/moment/energy determinations is encouraged.*" It is within this priority that we sought funds for this research and development of the energy-duration algorithms. Likewise, because this research is useful for the identification of slow-source tsunami earthquakes, this project also contributes to the *National Priority* of developing products and procedures that allow USGS to deliver rapid assessment of likely tsunami hazard.

The research performed here will be effective at reducing both financial and human losses in the United States from future large and great earthquakes by providing rapid information about earthquake size and duration/extent in real-time. This information can be used for both improving rapid tsunami warnings (particularly necessary for the US west coast, Alaska, Hawaii and Caribbean), and for the immediate assessment of the spatial extent of damage, due to large strong earthquakes, occurring within and nearby the US, its territories and overseas bases.

II) Dataset

Using the below-described tools, we systematically analyze all earthquakes with an initial reported magnitude greater than 5.5. This low cut-off, 2 orders of magnitude lower than the planned utility, was chosen to ensure a significant number of events for testing the robustness of the computational algorithms in real-time. Thus, at the time of this writing, there are now 277 analyzed real-time events in our growing database, with only real-time events with M>7.5 (Appendix A; h*ttp://geophysics.eas.gatech.edu/RTerg/;* Figure 1). In doing so, we were able to rapidly adapt the code to improve real-time analysis, and have found surprising robust for many events even at this low magnitude.

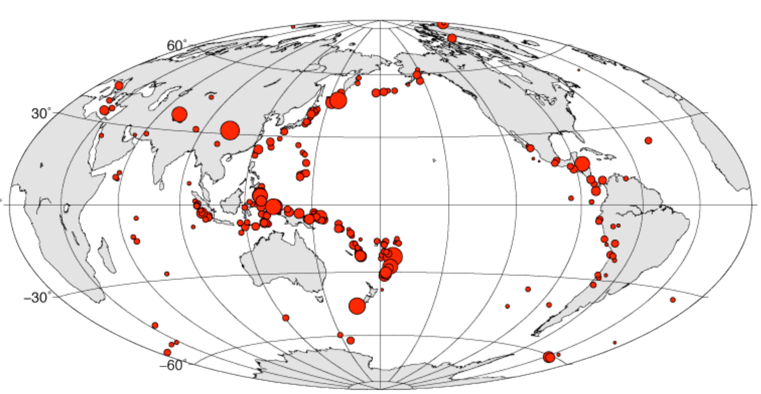

Figure 1: 277 events with initial magnitude >5.5 (scaled by energy), thus far analyzed by the real-time algorithms. With the exception of the Wenchuan earthquake from May 2008, events begin Jan 1, 2009.

III) Toolset Implementation

We implemented the FORTRAN algorithm *Nergy* to read *SAC* formatted waveforms, along with numerous UNIX/Linux scripts to determine the high-frequency energy, and rupture duration rapidly after an event. In the processing that is active at GT and the PTWC, an event detection is initiated when an event above a minimum threshold (currently M>5.5) is reported in the Earthquake Information Distribution System (EIDS), and is reported by either the NEIC, PTWC, ATWC, or Puerto Rico Warning system. Once an event report is detected, and is unique, automated iterative processing begins as follows:

1) The USGS MetaData server is interrogated for a list of currently available stations within the teleseismic range of the event.
2) The list is used to create a batch request of data through the USGS Continuous Waveform Buffer (CWB). This request is set to timeout after 1 minute (regardless of status of retrieval).
3) Theoretical *P*-arrivals are added to data based on initial location and timing.
4) For each retrieved station, incremental energy growth is calculated at both broad-band and high-frequency energies, for every 1 second, for at least 300 s. At this time, the pre-*P* energy is also calculated for signal-to-noise ratio (SNR) determinations.
5) Energy growth curves are summed for all stations above the SNR energy cutoff (3) relative to the *P*-arrival, and pre-*P* noise level is removed.
6) For the cumulative curves, the cross-over duration, event energy, and magnitudes are determined, plotting is performed, and event-specific webpage is created.
7) If event is above a larger threshold (currently $M_E \geq 6.5$) an email is sent to individuals at

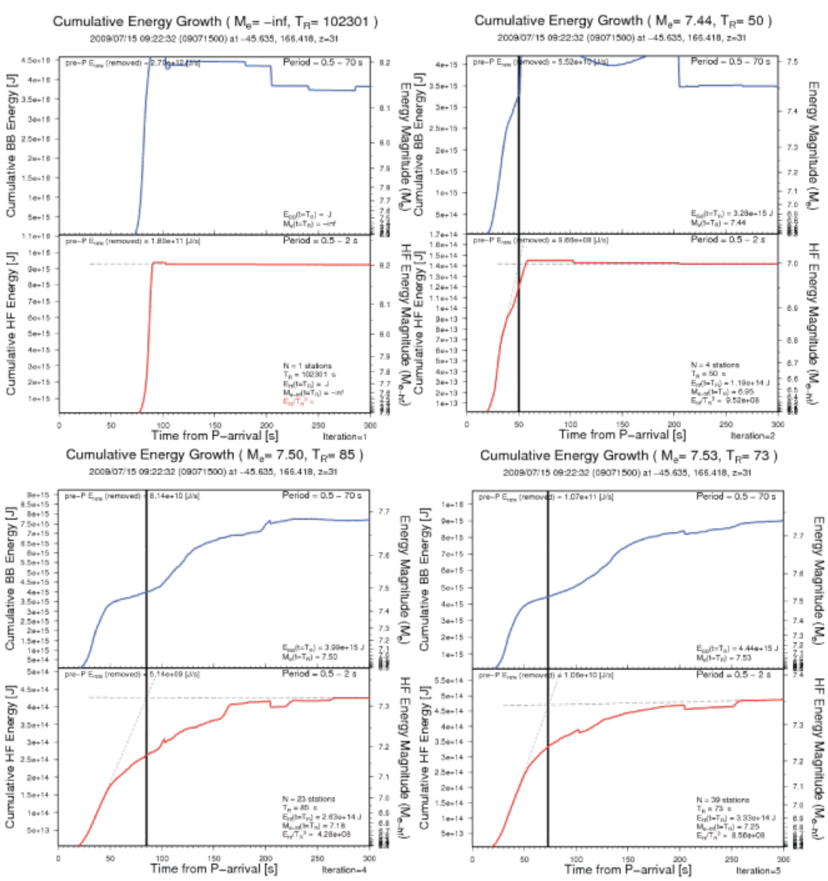

Figure 2: Real-time iterations are shown for an Mw 7.5 shallow thrust event off the southern tip of New Zealand' (2009/07/15). Iterations repeat for 5 cycles to improve solutions as more data become available (from 1 to 39 stations over iterations that finished 7 to 15 minutes after nucleation). All iterations online, and can be retrieved at the addresses described in text.

the PTWC, NEIC, the PI and graduate student identifying event, and initial estimates of magnitude and duration.

At present, this process will repeat for five iterations (Figure 2), were results are usually stable after 3-4 iterations. For the most recent events (after 02/18/09) each iteration is saved on the website for further inspection of the real-time capability. The naming conventions for iterative results are followed by '.*n*', where *n* is the iteration number (e.g. 5th iteration of event in figure 2: *http://geophysics.eas.gatech.edu/RTerg/2009/09071500.5*). Per-station results vary significantly (σ=0.5 log units E) from the final result, suggesting that multiple stations, with good azimuthal distribution are necessary for accurate results (Figure 3). Once a reviewer examines the event, and modifies the data used, or duration detection the event iteration is then changed to 'A'. All results shown in Appendix A are for analyst corrected results.

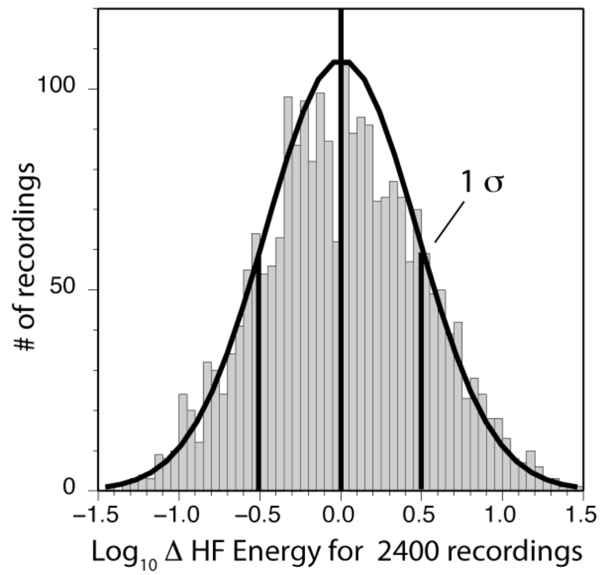

Figure 3: Log deviation in real-time E_{hf} for 180 earthquakes after Jan. 1, 2009 with initial magnitude ≥5.5. Stations are log-normally distributed with 0.5 unit (log E) standard deviation, corresponding to 0.33 M_e. Only recent events are shown because a change in response file sources from IRIS to the NEIC essentially removed systematically biased stations that were common in the earlier dataset.

Details of the products are best described using a single case example, and hence is described below. With this, recommendations for further improvements are explained.

IV) Wenchuan Example

The May 12, 2008 Wenchuan earthquake was one of the largest, and best example events that could be processed using the newly developed algorithms. The event is a shallow continental thrust that occurred in central China, yielding a nearly ideal azimuthal distribution of available real-time teleseismic broadband instrumentation for detection (Figure 4). Unlike other events in the catalog, this event was post-processed, utilizing the real-time codes that were developed subsequent to the event. All data were obtained using the same calls and NEIC continuous waveform buffer data (CWB) and instrument responses that are obtained during real-time processing. Likewise the figures are produces utilizing the same codes, but with slight stylistic and identifying modifications added for presentation here (Figure 4). The 'real-time' calculation is performed with 68 stations that were above the SNR threshold, and the energy growth was calculated removing the mean pre-*P* Energy noise for both the high-frequency and broad-band determinations (shown in upper left corner of top left panel). The duration determined from the high-frequency energy (red) is 107 s, which is used as the end-point for the broadband energy calculation, that is found to be 1.9e16 J, corresponding to M_e=7.95, almost the gCMT-determined M_W, 7.9. Individual station determinations vary significantly, having a standard deviation near .33 M_e. (spatial deviation shown in figure 4 [bottom-left]), however the inclusion of 3 or more stations dramatically improves the reliability of the solution energy.

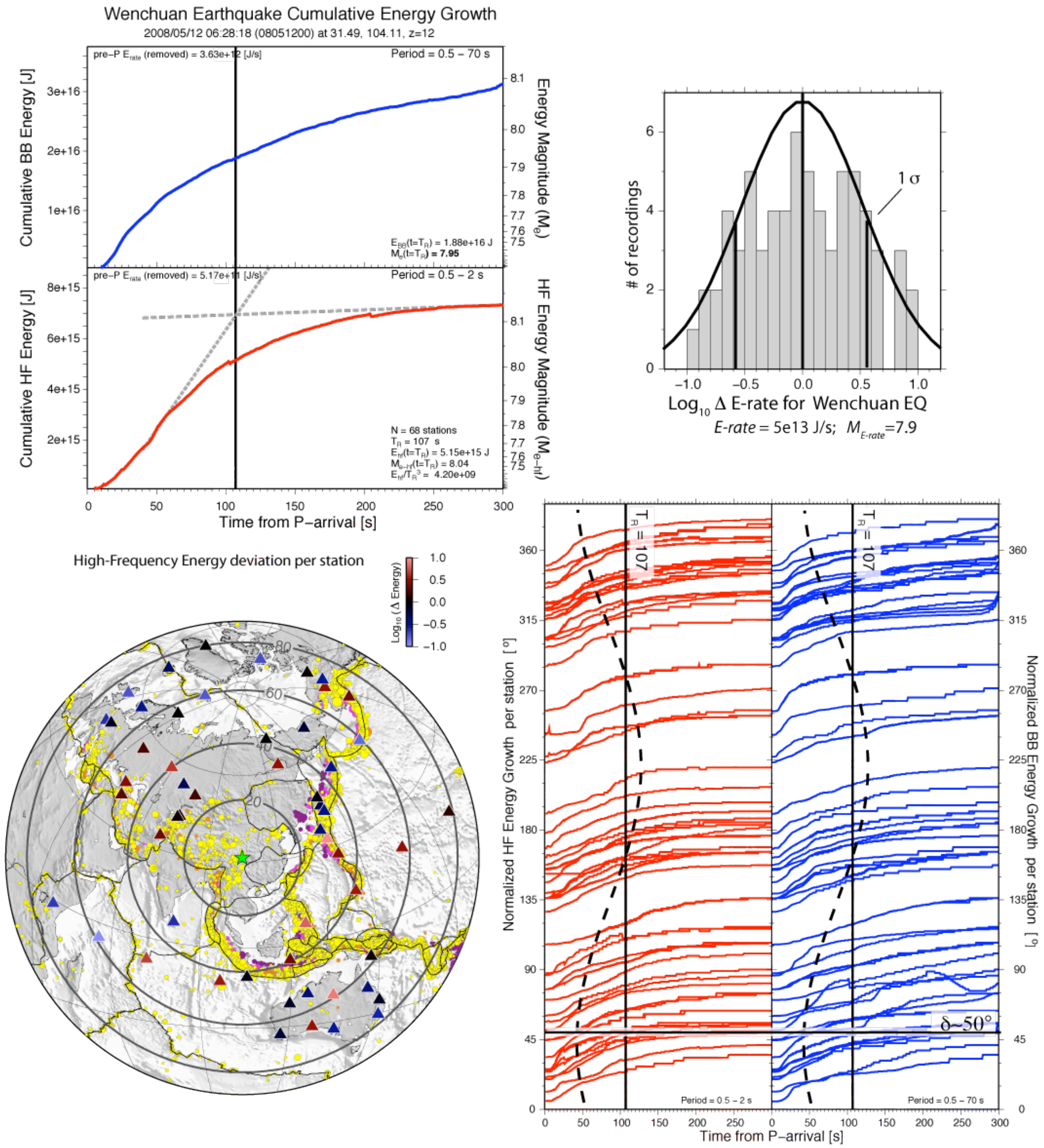

Figure 4: ***Wenchuan Earthquake***. The energy growth and station distribution is shown for the May 12, 2008 thrust event using the current real-time implementation (*post-processed using codes developed after event*). [top-left] Using the average energy from 68 stations, the rupture duration is identified as T_R=107 s, and having an energy magnitude, M_e=7.95. However, evaluation of individual stations [bottom-right] illuminates that T_R determined from the station-averaged energy to be heavily effected by the longest-individual stations, and the true duration is somewhat less. Like most events with $M_e \geq 7.5$, directivity is large, and in this case, shows a primarily northeastern rupture direction, δ as the orientation with the shortest apparent duration. While directivity has a small effect on the one-station energy calculations [bottom left], individual station durations will yield both better assessments of true duration, and a rapid indication of directivity, assuming sufficient station spacing. [top-right] Energy-rate magnitude for this event is 7.9, and individual stations show about a factor of 0.5 standard deviation suggesting 0.33 deviation in magnitude.

Because of the near-optimal azimuthal distribution in stations for this event, the rupture directivity is clearly visible as a change in the one-station apparent rupture duration (figure 4 [bottom-right]). The shortest apparent durations are near 45-60° CW from N, the approximate strike of the fault. This result suggests that given sufficient azimuthally distributed data, we should be able to rapidly assess the rupture directivity using an adaptation of the current algorithms to include one-station durations, and directivity fitting. Such information, along with the nucleation point, source-finiteness determined from duration, will be of great value for rapidly earthquake mitigation. The per-station energy-growth solutions for the Wenchaun earthquake highlight that most individual stations exhibit cut-offs that are shorter in duration, and hence the 107 s duration determined from the station-averaged energy is late. This suggests that the current methodology for determining duration may be late, and will be sensitive to the azimuthal availability of stations. As a part of this continued funding, we plan to implement test and implement individual station determinations of duration that will be used for both directivity and ultimate duration determination, rather than bulk duration estimation from the averaged energy growth.

V) Project Accomplishments:

1) We developed real-time algorithms that rapidly and robustly report earthquake energy, high-frequency energy, and duration. More data are necessary to determine the precise robustness threshold for each parameter, though initial results suggest energy is valid for most events greater than M 5.5, wile durations are most precise for events greater than M 6.5.
2) We developed a test catalog of all global earthquakes greater than M_w 5.5 beginning in 2009. We calculated "estimated" and "corrected" energies for each event using the array of globally available data, as well as cross-over duration. Integration of these results with earlier events back to 1997 are the subject of a manuscript in preparation for the Journal of Geophysical Research.
3) Using this dataset we explore the lower detection threshold for duration estimates. While we can detect many events down to M 5.5, giving accurate radiated energies, durations are suspect for most events below M 6.5
4) We explored alternative methods for T_R fitting. Early testing was modestly successful, however now with lower threshold and newer, higher-resolution energy-growth solutions, methods will again be evaluated. It appears that individual station $T_{R.}$ will yield more robust values than the currently implemented bulk-energy derived $T_{R.}$
5) We determined a new $M_{e\text{-}hf}$, for use with short-period data, or for direct rapid calculation from cut-off. Initial assessments of this magnitude were made for events greater than M6.5

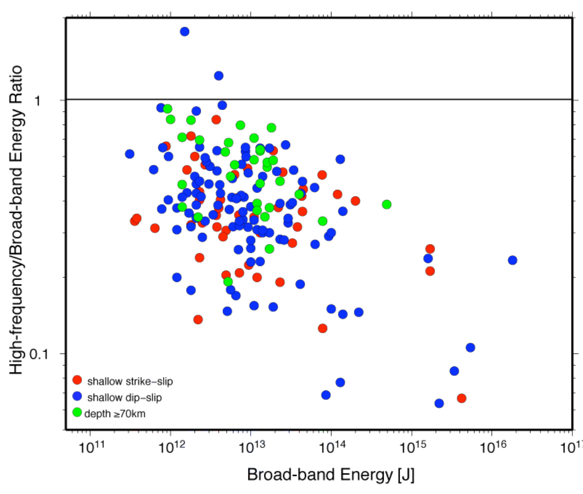

Figure 5: *Real-time High-Frequency/Broadband Energy:* for events in appendix are shown. Events are color-coded to differentiate shallow strike-slip, dip-slip, and deep earthquakes. Many of the smaller events do not radiate significant lower-frequency energy in *P*, and high-frequency range captures most signal. No distinct deviation can be identified for deep earthquakes, nor for strike-slip from shallow dip-slip mechanisms.

because high-frequency energies were 20% of the broadband. However, now with smaller events, as expected, the deviation is less pronounced (Figure 5). Hence, the high-frequency energy magnitude will need to be re-evaluated.

6) We have successfully applied codes to the NEIC and PTWC real-time streams.
7) We developed a new website that includes tabulated results and individual data plots for all events within the test catalog *(http://geophysics.eas.gatech.edu/RTerg)*.

VI) Papers and Presentations (Published copies will be sent to Program Manager, once available):

Newman, A. V., and J. A. Convers, An Energy Rate Magnitude for Large Earthquakes, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract T13F-01, Fall 2008.

Newman, A. V., & J. Convers, A Rapid Energy-Duration Discriminant for Tsunami Earthquakes, [Under Revision: *Geoph. Res. Lett.*]

Convers, J. A., and A. V., Newman, Global evaluation of Earthquake Energy between 1997 and 2009: Spatial and Downdip characteristics [in prep for *J. Geoph. Res.*].

References:

Boatwright, J. & G. L. Choy, Teleseismic Estimates of the Energy Radiated by Shallow Earthquakes, *JGR* **91** (B2) p. 2095-2112, 1986.

Choy, G. and J. Boatwright, The Energy Radiated by the 26 December 2004 Sumatra–Andaman Earthquake Estimated from 10-Minute *P*-Wave Windows, *BSSA* **97** (1a), S18-S24; doi:10.1785/0120050623 2007.

Newman, A. V. & E. A. Okal, Teleseismic Estimates of Radiated Seismic Energy: The E/M_0 Discriminant for Tsunami Earthquakes, *JGR.*, **103** (11), 26,885-98, 1998.

NEHRP (National Earthquake Hazards Reduction Program), Program Announcement 08HQPA0001: USGS Earthquake Hazards Program External Research Support, [Request for Proposals] *http://earthquake.usgs.gov/research/external*, 2008.

Weinstein, S., & E. Okal, The mantle wave magnitude M_m and the slowness parameter *THETA*: Five years of real-time use in the context of tsunami warning, *BSSA,* **95,** 779-799, 2005.

Appendix A. Catalog of real-time events developed through this project. A real-time event is triggered by notification of an initial M≥5.5 event from one of the warning centers (PT=Pacific Tsunami Warning Center; AT=Alaska Tsunami Warning Center; US=National Earthquake Information Center; PR=Puerto Rican Tsunami warning center). Events names are the date and sequential event number. Locations are from the initial identification from EIDS. Both high-frequency and broadband magnitudes, along with energies, cross-over duration, and energy to duration ratios. The number of stations used per calculation, *N,* and the source are also shown.

Event name	Time	Lat.	Lon.	Depth	M_{E-hf}	M_{E-bb}	E_{hf}	E_{bb}	T_R	E/T_R^3	N	Source
	hh:mm:ss	[°]	[°]	[km]			[J]	[J]	[s]	[J/s^3]		
09072602	23:10:28	-4.77	102.93	81	6.37	6.09	1.6E+13	3.0E+13	37	3.2E+08	43	PT
09072601	23:01:37	-17.7	168.02	73	5.99	5.77	4.4E+12	1.0E+13	44	5.2E+07	28	AT
09072600	06:06:42	-0.39	132.29	5	5.77	5.79	2.0E+12	1.1E+13	46	2.1E+07	18	AT
09072502	19:03:21	-29.55	-177.15	36	5.69	5.34	1.5E+12	2.3E+12	45	1.7E+07	28	AT
09072501	01:42:29	-6.52	154.88	66	6.41	6.05	1.8E+13	2.7E+13	45	2.0E+08	46	PT
09072500	01:43:41	59.46	-143.7	10	5.09	4.76	1.9E+11	3.1E+11	37	3.8E+06	44	PT
09072401	21:45:56	-59.52	149.61	44	5.63	5.42	1.3E+12	3.0E+12	71	3.5E+06	15	AT
09072400	03:12:00	31.18	85.97	34	5.89	5.47	3.1E+12	3.7E+12	35	7.2E+07	52	AT
09072200	03:53:10	26.91	55.78	62	5.43	5.03	6.2E+11	8.0E+11	22	5.8E+07	31	PT
09072000	15:19:47	2.31	126.96	35	5.59	5.34	1.1E+12	2.3E+12	42	1.5E+07	27	US
09071900	11:39:49	-9.09	95.41	33	5.34	5.16	4.7E+11	1.2E+12	59	2.3E+06	14	PT
09071701	03:20:32	-21.81	-175.07	40.9	5.41	5.2	5.8E+11	1.4E+12	36	1.2E+07	23	US
09071603	23:52:04	4.84	126.67	69	5.66	5.53	1.4E+12	4.4E+12	51	1.1E+07	24	AT
09071602	22:18:19	-46.49	165.9	31	5.95	5.77	3.8E+12	1.0E+13	41	5.5E+07	17	AT
09071601	17:59:42	-17.5	167.7	40	5.61	5.46	1.2E+12	3.4E+12	39	2.0E+07	19	AT
09071600	10:48:16	24.02	122.07	37	5.56	5.29	9.8E+11	1.9E+12	48	8.8E+06	35	PT
09071505	20:10:47	-3.32	150.67	49	5.96	5.85	3.9E+12	1.3E+13	38	7.1E+07	31	AT
09071503	13:50:42	-45.67	166.58	35	5.67	5.79	1.4E+12	1.1E+13	52	1.0E+07	15	AT
09071502	12:55:47	-3.82	150.86	78	5.56	5.5	1.0E+12	3.9E+12	49	8.5E+06	23	PT
09071500	09:22:32	-45.63	166.42	31	7.2	7.51	2.8E+14	4.2E+15	58	1.4E+09	39	AT
09071401	18:38:07	-21.78	-67.01	161.8	5.72	5.23	1.7E+12	1.6E+12	11	1.3E+09	28	US
09071400	11:27:37	22.87	143.64	95.8	5.61	5.4	1.2E+12	2.8E+12	51	8.8E+06	38	US
09071301	18:04:59	23.82	122.13	1	6.37	6.19	1.6E+13	4.4E+13	49	1.4E+08	50	AT
09071300	10:52:22	-9.39	119.54	99	6.18	5.84	8.3E+12	1.3E+13	71	2.3E+07	44	AT
09071200	06:12:43	-15.18	-70.53	165	6.16	5.8	7.8E+12	1.1E+13	17	1.6E+09	89	PT
09071100	12:35:21	-20.57	-174.22	33	5.75	5.36	1.9E+12	2.5E+12	39	3.2E+07	31	PT
09071001	03:48:07	0.22	123.54	248	5.37	5.4	5.1E+11	2.9E+12	35	1.2E+07	15	AT
09071000	00:49:07	47.92	148.56	327	5.39	5.03	5.5E+11	8.0E+11	8	1.1E+09	59	AT
09070901	20:53:24	22.03	144.87	80	5.77	5.41	2.0E+12	2.9E+12	54	1.3E+07	46	PT
09070900	11:19:23	25.56	101.12	57	5.68	5.38	1.5E+12	2.7E+12	48	1.4E+07	42	PT
09070800	19:23:43	-35.82	-102.71	10	5.54	5.34	9.3E+11	2.3E+12	41	1.4E+07	36	AT
09070701	19:11:44	75.3	-71.85	10	6.23	6.07	9.9E+12	2.9E+13	71	2.8E+07	52	AT
09070601	22:35:09	25.02	127.98	51	5.85	5.64	2.7E+12	6.6E+12	21	2.9E+08	40	AT
09070600	14:53:16	50.82	177.11	58	6.18	5.99	8.3E+12	2.2E+13	34	2.1E+08	58	PT
09070400	06:49:37	9.78	-78.81	48	6.29	5.95	1.2E+13	1.9E+13	44	1.4E+08	90	AT
09070302	20:28:16	-49.81	-8.12	10	5.25	4.96	3.3E+11	6.2E+11	29	1.4E+07	17	AT
09070301	11:00:13	24.99	-109.54	14	5.38	5.19	5.3E+11	1.4E+12	33	1.5E+07	41	AT
09070300	09:56:59	24.96	-109.77	33	4.84	4.65	8.3E+10	2.1E+11	33	2.3E+06	28	PT
09070102	21:10:44	1	126.09	37	6.04	5.73	5.2E+12	8.7E+12	44	6.1E+07	38	PT
09070101	20:53:38	13.22	143.82	178	5.79	5.61	2.2E+12	5.9E+12	89	3.1E+06	35	AT
09070100	09:30:11	34.01	25.46	32	6.44	6.2	2.1E+13	4.4E+13	50	1.7E+08	38	AT
09062801	14:19:26	1.31	122.07	10	5.7	5.39	1.6E+12	2.7E+12	45	1.7E+07	33	US
09062700	15:45:50	-33.05	-15.89	17	5.56	5.35	9.9E+11	2.4E+12	54	6.3E+06	27	PT

09062301	14:19:20	-5.25	153.51	59	7.08	6.89	1.9E+14	4.9E+14	59	9.2E+08	50	AT
09062300	07:37:17	38.79	142.68	30	5.69	5.4	1.6E+12	2.8E+12	43	2.0E+07	62	AT
09062204	22:24:11	-23.81	-179.82	537	5.76	5.45	2.0E+12	3.4E+12	9	2.7E+09	27	AT
09062203	21:05:33	51.47	-178.31	24.4	5.4	5.08	5.7E+11	9.5E+11	32	1.7E+07	43	US
09062202	19:55:24	50.98	-178.16	37	5.71	5.42	1.7E+12	3.1E+12	67	5.6E+06	46	AT
09062201	19:28:05	61.94	-150.52	52	5.69	5.28	1.5E+12	1.8E+12	62	6.4E+06	46	PT
09062200	18:15:39	76.29	6.97	10	5.21	5.03	2.9E+11	7.8E+11	26	1.7E+07	45	PT
09062000	09:21:24	-5.25	102.96	48	6.18	5.84	8.4E+12	1.3E+13	40	1.3E+08	49	AT
09061901	15:06:26	14.01	145.13	115	5.69	5.34	1.6E+12	2.3E+12	93	1.9E+06	17	AT
09061900	14:05:00	35.21	28.46	30	5.64	5.53	1.3E+12	4.5E+12	43	1.6E+07	24	AT
09061700	07:08:25	51.96	-175.29	107	5.56	5.35	1.0E+12	2.4E+12	63	4.0E+06	49	PT
09061600	20:05:58	-54.38	6.01	14	5.86	5.65	2.8E+12	6.8E+12	37	5.5E+07	25	AT
09061500	12:05:26	8.79	93.51	33	5.34	5.12	4.7E+11	1.1E+12	35	1.1E+07	31	PT
09061402	20:25:15	-58.94	-25.11	10	5.29	5.07	3.9E+11	9.0E+11	48	3.5E+06	26	US
09061401	05:58:46	5.32	126.47	45	6.31	6.03	1.3E+13	2.5E+13	51	1.0E+08	47	AT
09061400	03:36:05	-7.6	117.46	52	5.75	5.51	1.9E+12	4.1E+12	58	9.7E+06	40	PT
09061300	17:17:40	44.74	78.9	33	5.64	5.27	1.3E+12	1.8E+12	23	1.1E+08	45	PT
09061200	09:44:20	-17.82	167.72	31	5.87	5.77	2.8E+12	1.0E+13	37	5.6E+07	32	AT
09061000	23:13:24	-41.65	-84.06	20	5.5	5.31	8.1E+11	2.1E+12	32	2.5E+07	30	AT
09060900	05:11:09	-22.84	171.43	34	5.51	5.3	8.2E+11	2.0E+12	44	9.6E+06	35	AT
09060801	05:13:20	16	-87	23	5.67	5.42	1.4E+12	3.0E+12	51	1.1E+07	79	AT
09060800	04:33:18	-22.16	-179.43	576	5.89	5.5	3.1E+12	4.0E+12	5	2.4E+10	38	AT
09060700	17:25:00	-15.25	170.92	73	5.2	5.04	2.8E+11	8.2E+11	55	1.7E+06	14	PT
09060601	20:33:30	24.05	-46.19	10	5.83	5.66	2.5E+12	7.1E+12	31	8.4E+07	68	AT
09060600	05:52:42	35.68	141.16	36	5.9	5.63	3.2E+12	6.3E+12	45	3.5E+07	67	PT
09060501	21:17:04	-17.34	167.68	73	5.46	5.23	6.9E+11	1.6E+12	43	8.7E+06	22	AT
09060500	03:30:31	41.61	143.74	13	6.21	6.07	9.5E+12	2.9E+13	55	5.7E+07	66	AT
09060401	17:25:26	-45.85	34.26	10	5.58	5.56	1.0E+12	4.9E+12	48	9.5E+06	26	AT
09060400	17:10:10	-17.55	167.63	33	5.47	5.31	7.2E+11	2.1E+12	35	1.7E+07	27	PT
09060301	21:37:38	19.52	-109.15	12	5.1	4.97	2.0E+11	6.4E+11	52	1.4E+06	40	PT
09060300	18:54:40	-49.98	120.64	10	5.48	5.57	7.5E+11	5.1E+12	41	1.1E+07	25	US
09060201	02:26:57	-17.87	167.56	33	5.58	5.56	1.0E+12	4.9E+12	36	2.2E+07	28	PT
09060200	02:17:11	-17.69	167.82	74	6.14	6.05	7.3E+12	2.6E+13	47	7.0E+07	44	AT
09053000	19:56:42	-6.55	150.12	33	5.64	5.23	1.3E+12	1.6E+12	35	3.0E+07	23	PT
09052904	15:26:25	-43.78	-107.11	10	5.33	5.14	4.5E+11	1.2E+12	26	2.5E+07	34	US
09052903	19:51:18	5.88	125.98	156	6.25	5.95	1.1E+13	1.9E+13	73	2.8E+07	45	PT
09052902	06:20:19	-17.1	168.5	38	5.51	5.36	8.2E+11	2.5E+12	63	3.3E+06	20	AT
09052901	01:04:41	18.37	-106.68	25.1	4.97	4.82	1.3E+11	3.8E+11	42	1.8E+06	46	US
09052900	00:58:37	-3.91	127.63	48	6.02	5.74	4.8E+12	9.3E+12	50	3.8E+07	41	AT
09052801	21:07:44	-55.81	-27.96	61	4.9	4.25	1.0E+11	5.4E+10	5	8.0E+08	15	PT
09052800	08:25:05	16.69	-86.38	22	7.33	7.25	4.4E+14	1.7E+15	48	4.0E+09	76	__
09052500	05:10:12	-28.43	-71.23	35	5.3	4.97	4.1E+11	6.4E+11	48	3.7E+06	64	US
09052400	00:58:06	-31.36	-177.31	35	5.98	5.86	4.3E+12	1.4E+13	44	5.0E+07	26	AT
09052200	19:24:19	18.39	-98.3	51	6.06	5.72	5.6E+12	8.6E+12	62	2.3E+07	68	AT
09052100	05:53:58	7.83	127.21	30	5.76	5.59	2.0E+12	5.4E+12	45	2.2E+07	40	PT
09052000	09:40:23	-22.63	-174.07	104	5.59	5.31	1.1E+12	2.1E+12	39	1.8E+07	35	AT
09051900	17:35:08	25.39	37.72	53	5.42	5.25	6.1E+11	1.7E+12	11	4.6E+08	43	PT
09051800	14:01:13	-15.81	-74.61	98	5.29	5.08	3.8E+11	9.4E+11	39	6.4E+06	66	AT
09051700	06:23:00	-16.81	-173.45	43	5.38	5.21	5.3E+11	1.4E+12	62	2.2E+06	8	PT
09051601	18:22:35	56.54	-152.18	33	5.68	5.49	1.5E+12	3.9E+12	34	3.8E+07	19	PT
09051600	00:53:50	-31.6	-178.11	34	6.7	6.53	5.1E+13	1.4E+14	46	5.2E+08	29	AT
09051400	09:24:55	-0.17	125.06	49	5.14	5.06	2.3E+11	8.8E+11	12	1.3E+08	11	PT
09051301	21:31:18	-15.85	-172.95	36	5.44	5.2	6.5E+11	1.4E+12	59	3.2E+06	15	AT
09051300	01:15:20	-6.38	154.99	78.5	5.61	5.27	1.2E+12	1.8E+12	34	3.0E+07	14	US
09051202	12:38:38	-12.51	65.08	63	5.47	5.37	7.2E+11	2.5E+12	14	2.6E+08	42	AT
09051201	03:30:32	13.1	145.51	42	5.51	5.22	8.4E+11	1.5E+12	50	6.7E+06	18	PT
09051200	01:26:28	-5.78	149.67	94	6.32	5.93	1.4E+13	1.8E+13	8	2.7E+10	41	PT
09051000	01:16:11	1.24	-85.24	26	5.39	5.34	5.5E+11	2.3E+12	40	8.6E+06	47	AT
09050900	19:34:35	36.63	142.55	33	5.63	5.42	1.2E+12	3.1E+12	40	2.0E+07	16	PT

09050801	21:22:30	58.13	164.27	10	5.57	5.29	1.0E+12	2.0E+12	32	3.1E+07	11	US
09050800	13:44:52	-31.99	-69.49	93	5.88	5.55	3.0E+12	4.8E+12	62	1.2E+07	50	AT
09050500	22:26:11	-4.98	151.73	138	5.48	5.32	7.6E+11	2.2E+12	10	7.6E+08	15	PT
09050401	09:10:23	10.23	-66.95	33	5.63	5.31	1.2E+12	2.0E+12	51	9.4E+06	76	PT
09050400	03:33:51	-3.56	135.53	50.6	5.46	5.02	7.1E+11	7.6E+11	14	2.6E+08	6	US
09050300	16:21:47	14.63	-91.31	98	6.1	5.92	6.4E+12	1.7E+13	91	8.5E+06	59	AT
09050200	02:19:12	54.68	-161.57	44	5.41	5.06	5.8E+11	8.8E+11	10	5.8E+08	47	PT
09050101	12:57:07	26.22	140.85	414	5.78	5.43	2.1E+12	3.2E+12	20	2.6E+08	32	PT
09050100	06:03:07	-10.56	162.44	22	6.03	5.74	4.9E+12	9.1E+12	32	1.5E+08	31	AT
09043000	10:04:30	27.86	61.5	106.8	5.37	5.36	5.1E+11	2.4E+12	13	2.3E+08	26	US
09042801	19:54:34	52.62	-34.95	10	4.96	4.81	1.2E+11	3.6E+11	51	9.4E+05	22	US
09042800	11:21:22	42.52	145.01	54	5.83	5.54	2.5E+12	4.5E+12	26	1.4E+08	58	AT
09042700	16:46:32	17.3	-99.47	44	5.9	5.69	3.2E+12	7.6E+12	59	1.5E+07	56	AT
09042600	00:06:48	-30.09	-178.45	70	6.2	5.9	9.1E+12	1.6E+13	23	7.5E+08	17	AT
09042201	15:18:18	-17.19	-174.01	211	5.41	4.54	5.9E+11	1.4E+11	18	1.0E+08	3	PT
09042200	01:48:30	-13.61	167.15	224	5.74	5.47	1.8E+12	3.6E+12	49	1.6E+07	17	AT
09042102	21:10:03	-10.85	165.97	71.3	5.87	5.21	2.8E+12	1.5E+12	52	2.0E+07	15	US
09042101	05:26:11	50.69	155.37	142	6.17	5.85	8.2E+12	1.3E+13	36	1.8E+08	71	AT
09042100	00:53:14	-19.93	169.87	35	5.88	5.84	3.0E+12	1.3E+13	76	6.7E+06	11	AT
09042000	12:21:25	-4.14	129.76	49.1	5.82	5.67	2.4E+12	7.2E+12	58	1.3E+07	26	US
09041900	05:23:31	3.95	126.9	73	6.41	6.12	1.8E+13	3.4E+13	48	1.7E+08	36	PT
09041802	19:18:02	46.19	151.43	52	6.55	6.44	3.0E+13	1.0E+14	69	9.2E+07	66	AT
09041801	17:49:39	-20.65	-178.34	557	5.93	5.63	3.5E+12	6.3E+12	8	6.9E+09	19	AT
09041800	02:03:44	-29.1	-176.3	41	6.26	5.93	1.1E+13	1.7E+13	50	8.9E+07	26	AT
09041703	16:10:55	-8.29	161.38	35	5.82	5.77	2.4E+12	1.0E+13	34	6.2E+07	23	AT
09041702	14:51:57	46.27	151.57	34	5.38	5.03	5.2E+11	8.0E+11	12	3.0E+08	36	PT
09041700	02:08:10	-19.68	-70.47	33	5.94	5.81	3.7E+12	1.2E+13	68	1.2E+07	80	PT
09041604	21:27:57	34.23	70.12	47	5.25	4.89	3.4E+11	4.8E+11	14	1.2E+08	26	AT
09041603	20:42:32	-3.3	100.26	35	5.04	4.39	1.6E+11	8.6E+10	60	7.6E+05	10	PT
09041602	19:55:28	-3.34	100.19	33	5.42	5.17	6.1E+11	1.3E+12	51	4.6E+06	13	PT
09041601	14:57:08	-60.63	-27.25	30	6.43	6.54	2.0E+13	1.4E+14	41	2.8E+08	24	AT
09041600	00:43:29	-6.78	153.96	44	5.8	5.67	2.3E+12	7.2E+12	47	2.2E+07	16	AT
09041502	20:01:33	-3.38	100.2	24	6.52	6.41	2.7E+13	9.3E+13	58	1.4E+08	51	AT
09041501	17:47:27	-3.26	100.22	28	5.82	5.61	2.4E+12	5.8E+12	53	1.6E+07	32	PT
09041500	10:20:05	12.36	58.09	10	5.41	5.28	5.8E+11	1.8E+12	32	1.8E+07	29	US
09041400	23:29:33	-16.26	-177.79	10	5.68	5.67	1.5E+12	7.2E+12	34	3.8E+07	13	US
09041100	21:45:21	4.31	125.74	161	5.21	5.15	3.0E+11	1.2E+12	12	1.7E+08	15	PT
09040900	00:53:02	42.61	13.2	15	5.28	5.15	3.7E+11	1.2E+12	35	8.7E+06	26	PT
09040701	17:47:41	42.43	13.49	13	5.52	5.24	8.5E+11	1.6E+12	46	8.8E+06	43	AT
09040700	04:23:36	45.92	151.67	43	6.56	6.66	3.2E+13	2.2E+14	52	2.2E+08	90	AT
09040601	12:16:03	-22.89	-174.25	33	5.74	5.66	1.8E+12	7.0E+12	40	2.8E+07	53	PT
09040600	01:32:45	42.4	13.37	10	6.2	6	9.0E+12	2.3E+13	40	1.4E+08	89	AT
09040501	12:56:15	-5.2	68.52	10	5.4	5.28	5.7E+11	1.8E+12	40	8.9E+06	62	PT
09040500	09:36:29	31.98	131.9	57	5.99	5.69	4.3E+12	7.7E+12	34	1.1E+08	74	PT
09040402	11:07:11	-22.44	-174.16	51	5.75	5.62	1.9E+12	6.0E+12	50	1.5E+07	60	AT
09040401	07:19:44	-62.42	155.75	21	5.82	5.81	2.4E+12	1.2E+13	91	3.2E+06	38	AT
09040400	05:32:00	4.99	127.12	89	6.7	6.48	5.1E+13	1.2E+14	65	1.8E+08	61	AT
09040302	17:54:47	-27.8	-66.68	158	5.52	5.08	8.5E+11	9.2E+11	17	1.7E+08	75	AT
09040301	14:37:50	-31.52	-178.41	25	5.66	5.37	1.4E+12	2.5E+12	43	1.8E+07	47	PT
09040300	13:37:59	-8.26	130.2	35	5.87	5.61	2.9E+12	5.9E+12	77	6.3E+06	65	AT
09040101	06:29:38	-6.06	101.73	33	5.68	5.5	1.5E+12	4.0E+12	55	9.0E+06	62	PT
09040100	03:55:07	-3.71	144.23	79	6.22	6.36	9.8E+12	7.8E+13	59	4.8E+07	63	AT
09033100	15:29:30	18.35	146.04	166	6.1	5.8	6.4E+12	1.1E+13	60	3.0E+07	54	AT
09033002	12:11:59	51.4	-178.33	57	6.05	5.81	5.4E+12	1.2E+13	62	2.3E+07	89	AT
09033001	12:07:30	51.38	-178.09	35	6.13	5.86	7.0E+12	1.4E+13	55	4.2E+07	93	AT
09033000	07:13:07	56.47	-152.6	26	5.81	5.77	2.3E+12	1.0E+13	37	4.6E+07	96	AT
09032800	17:59:33	-3.09	139.69	87	6.39	6.16	1.7E+13	4.0E+13	63	6.9E+07	51	AT
09032602	19:19:59	27.32	126.84	142	6.04	5.87	5.2E+12	1.5E+13	78	1.1E+07	68	AT
09032601	17:35:12	-5.68	-81.37	1	5.53	5.31	9.0E+11	2.1E+12	30	3.3E+07	64	AT

09032600	06:14:23	-27.59	73.24	10	5.23	5.27	3.2E+11	1.8E+12	51	2.4E+06	58	AT
09032500	06:31:34	-17.04	-171.7	30	5.51	5.11	8.3E+11	1.0E+12	49	7.1E+06	55	AT
09032400	23:28:29	-5.21	151.84	47.8	5.95	5.79	3.7E+12	1.1E+13	54	2.4E+07	58	US
09032300	04:28:22	9.82	57.87	10	5.15	5.14	2.4E+11	1.2E+12	40	3.7E+06	65	US
09031900	18:17:37	-23.05	-174.29	4	7.98	7.94	4.2E+15	1.8E+16	65	1.5E+10	58	AT
09031800	09:03:12	3.67	126.74	59.2	6.09	5.85	6.1E+12	1.3E+13	47	5.9E+07	62	US
09031601	17:42:08	3.59	126.81	51	5.73	5.51	1.8E+12	4.2E+12	41	2.6E+07	63	AT
09031600	14:15:58	3.63	126.91	70	6.63	6.35	3.9E+13	7.7E+13	43	5.0E+08	63	AT
09031500	03:14:37	2.67	-94.84	19	5.21	5.33	3.0E+11	2.2E+12	34	7.6E+06	91	AT
09031400	17:38:22	-38.03	-179.24	27	5.57	4.99	1.0E+12	6.8E+11	42	1.4E+07	35	AT
09031201	23:23:34	5.5	-82.8	17	6.27	6.15	1.2E+13	3.8E+13	45	1.3E+08	114	AT
09031200	11:47:46	-52.91	27.29	10	5.6	5.22	1.1E+12	1.5E+12	59	5.4E+06	34	US
09031102	21:04:02	8.56	-83.11	23	5.53	5.39	9.0E+11	2.7E+12	30	3.3E+07	21	AT
09031101	17:24:39	8.46	-83.21	22	5.57	5.6	1.0E+12	5.6E+12	36	2.2E+07	22	AT
09031000	17:42:13	-1.86	139.06	7.8	5.83	5.72	2.5E+12	8.5E+12	58	1.3E+07	37	US
09030700	14:33:04	41.77	143.73	28	5.7	5.48	1.6E+12	3.7E+12	39	2.7E+07	36	PT
09030601	10:50:27	80.38	-2.28	12	6.83	6.63	8.0E+13	2.0E+14	40	1.2E+09	48	AT
09030600	07:01:51	-14.97	-172.67	33	5.59	5.32	1.1E+12	2.2E+12	59	5.4E+06	41	PT
09030501	19:41:41	80.25	-1.98	10	5.5	5.14	8.0E+11	1.2E+12	34	2.0E+07	139	US
09030500	19:33:15	-17.36	-178.83	540	5.88	5.55	3.0E+12	4.8E+12	13	1.4E+09	57	PT
09030200	00:03:44	-1.14	119.99	38	6.03	5.5	5.0E+12	4.0E+12	36	1.1E+08	58	PT
09030101	15:42:09	-21.56	-176.5	110	5.97	5.76	4.0E+12	9.7E+12	60	1.9E+07	59	AT
09030100	08:17:34	-27.38	-175.88	33	5.9	5.61	3.2E+12	5.8E+12	67	1.1E+07	52	PT
09022801	14:33:09	-60.61	-25	30	6.4	6.19	1.8E+13	4.3E+13	36	3.8E+08	34	AT
09022800	00:35:45	42.64	142.12	5.8	5.56	5.2	1.0E+12	1.4E+12	29	4.1E+07	125	US
09022600	21:09:33	-7.7	127.75	170	5.86	5.6	2.8E+12	5.6E+12	55	1.7E+07	53	PT
09022402	12:39:42	-23.19	170.51	34	6.03	5.92	5.1E+12	1.7E+13	38	9.2E+07	62	AT
09022401	12:13:18	1.55	97.21	52	5.75	5.32	1.9E+12	2.1E+12	51	1.4E+07	59	AT
09022400	05:58:03	13.82	146.53	35	5.98	5.86	4.2E+12	1.4E+13	65	1.5E+07	78	AT
09022300	05:56:34	0.53	98.57	59.1	5.98	5.52	4.2E+12	4.4E+12	42	5.7E+07	67	US
09022200	17:45:26	3.62	126.88	69	6.4	6.18	1.8E+13	4.2E+13	60	8.2E+07	61	AT
09022100	00:12:53	28.87	130.86	4.8	5.56	5.31	9.8E+11	2.1E+12	32	3.0E+07	71	US
09022001	03:48:50	34.15	73.94	18	5.72	5.38	1.7E+12	2.6E+12	57	9.4E+06	71	AT
09021900	09:03:21	-7.41	120.64	584	5.89	5.48	3.0E+12	3.8E+12	124	1.6E+06	57	PT
09021801	21:53:42	-27.47	-175.4	45	7.27	7.25	3.6E+14	1.7E+15	60	1.7E+09	51	AT
09021800	03:07:51	-52.98	20.87	11	5.47	5.36	7.2E+11	2.5E+12	31	2.4E+07	34	AT
09021701	03:31:01	-30.66	-178.37	58	5.89	6.21	3.1E+12	4.7E+13	112	2.2E+06	53	AT
09021700	00:13:02	37.57	141.24	86	5.1	4.88	2.0E+11	4.7E+11	46	2.0E+06	0	PT
09021601	23:16:41	37.41	21.07	10	5.65	5.56	1.3E+12	4.9E+12	68	4.2E+06	45	US
09021600	02:22:49	-29	-69.59	77.6	5.82	5.46	2.4E+12	3.5E+12	76	5.5E+06	0	US
09021501	10:04:52	-5.86	-80.95	37	5.92	5.71	3.4E+12	8.2E+12	67	1.1E+07	110	AT
09021500	09:24:33	40.28	142.54	78	6.27	5.98	1.1E+13	2.1E+13	45	1.2E+08	118	PT
09021400	02:06:56	-21.7	170.11	114	5.93	6.16	3.6E+12	3.9E+13	113	2.5E+06	53	PT
09021303	21:26:38	3.89	126.64	41.8	6.03	5.84	5.0E+12	1.3E+13	63	2.0E+07	68	US
09021302	16:49:12	3.69	127.09	35	5.77	5.72	2.0E+12	8.6E+12	62	8.5E+06	63	US
09021301	13:18:36	-8.52	-73.89	140	5.3	5.34	4.0E+11	2.3E+12	83	7.0E+05	90	AT
09021300	12:37:51	3.76	127.02	33	5.95	5.8	3.8E+12	1.1E+13	63	1.5E+07	65	PT
09021208	18:54:25	-31.22	-177.04	35	6.31	6.11	1.3E+13	3.3E+13	38	2.4E+08	43	AT
09021207	17:46:07	3.9	126.82	72	6	5.81	4.4E+12	1.2E+13	59	2.2E+07	63	PT
09021206	13:41:41	12.19	144.03	33	5.71	5.93	1.6E+12	1.7E+13	58	8.4E+06	70	PT
09021205	13:15:09	3.99	126.87	51	6.53	6.29	2.8E+13	6.2E+13	46	2.9E+08	62	AT
09021204	08:30:16	3.91	127.1	33	6.28	6.09	1.2E+13	3.1E+13	56	6.8E+07	51	PT
09021203	07:38:06	3.79	126.94	35	5.87	5.74	2.9E+12	9.2E+12	57	1.6E+07	65	US
09021202	03:49:42	3.88	126.87	51	6.43	6.2	2.0E+13	4.5E+13	56	1.1E+08	65	AT
09021201	01:25:32	3.96	126.81	70	5.87	5.7	2.9E+12	8.0E+12	55	1.8E+07	64	AT
09021200	00:03:00	3.88	127.05	33	5.9	5.69	3.2E+12	7.8E+12	54	2.0E+07	63	PT
09021107	22:14:30	3.71	126.89	71	6.34	6.09	1.4E+13	3.0E+13	59	7.1E+07	66	AT
09021106	20:45:30	-20.13	-68.99	105	5.72	5.56	1.7E+12	5.0E+12	66	6.0E+06	101	PT
09021105	19:01:56	3.88	126.52	35	6	6	4.5E+12	2.3E+13	60	2.1E+07	71	US

09021104	18:25:14	3.91	126.84	66	6.08	6.39	5.9E+12	8.6E+13	42	7.9E+07	67	PT
09021103	17:49:18	3.98	126.5	35	6.01	7.12	4.6E+12	1.1E+15	60	2.1E+07	73	US
09021102	17:34:54	3.82	126.84	54	7.29	7.23	3.8E+14	1.6E+15	49	3.2E+09	66	AT
09021101	13:52:46	-15.98	178.3	26	5.69	5.56	1.5E+12	4.9E+12	57	8.3E+06	61	AT
09021100	09:31:09	-20.87	-177.39	35	5.64	5.48	1.3E+12	3.7E+12	34	3.3E+07	53	US
09020900	14:09:05	-6.63	-81.2	33	5.59	5.64	1.1E+12	6.5E+12	46	1.1E+07	104	PT
09020800	15:34:38	-6.17	147.78	53.7	6.1	6	6.5E+12	2.3E+13	45	7.1E+07	58	US
09020600	02:58:36	-27.92	-71.06	51.9	5.69	5.55	1.6E+12	4.7E+12	53	1.0E+07	102	US
09020300	00:07:11	-18.97	169.44	267	5.5	5.46	8.1E+11	3.4E+12	43	1.0E+07	46	PT
09020200	17:53:22	-13.63	-76.61	13	5.73	5.66	1.8E+12	7.0E+12	56	1.0E+07	111	AT
09013100	21:51:53	36.74	141.55	39	5.85	5.7	2.7E+12	8.0E+12	44	3.2E+07	103	AT
09012900	22:28:06	-8.11	-71.28	612.7	5.52	5.1	8.4E+11	1.0E+12	9	1.2E+09	104	US
09012802	12:39:43	-17	-171.86	15	5.73	5.51	1.8E+12	4.2E+12	36	3.8E+07	69	AT
09012801	07:53:36	-9.28	124.3	33	6.09	5.85	6.1E+12	1.3E+13	69	1.8E+07	63	PT
09012800	00:01:14	-0.38	98.01	29	6.05	5.72	5.4E+12	8.6E+12	48	4.9E+07	78	AT
09012702	23:57:15	55.47	164.31	51	5.57	5.34	1.0E+12	2.3E+12	56	5.9E+06	123	PT
09012701	06:29:11	-17.78	-178.46	595	5.94	5.58	3.6E+12	5.3E+12	12	2.1E+09	53	PT
09012700	00:57:39	-11.82	117.35	33	5.58	5.39	1.1E+12	2.7E+12	60	4.9E+06	58	PT
09012602	19:33:07	-0.43	97.92	35	5.67	5.49	1.5E+12	3.9E+12	41	2.1E+07	60	AT
09012601	19:11:49	51.85	-171.15	39	5.81	5.49	2.4E+12	3.8E+12	34	6.0E+07	97	AT
09012401	18:09:49	59.48	-152.91	76	6.19	5.91	8.7E+12	1.6E+13	58	4.4E+07	141	AT
09012400	01:28:42	-28.19	-176.09	42	6.15	6.17	7.7E+12	4.1E+13	66	2.7E+07	53	AT
09012301	12:38:14	21.18	121.36	10	5.76	5.49	2.0E+12	3.8E+12	50	1.6E+07	66	US
09012202	20:16:35	-7.6	128.65	135	6.51	6.36	2.6E+13	7.8E+13	105	2.3E+07	81	PT
09012201	13:40:31	-6.23	148.56	73	6.38	6.3	1.7E+13	6.3E+13	80	3.3E+07	53	AT
09012200	03:01:54	-0.76	127.4	104	5.98	6.01	4.2E+12	2.4E+13	83	7.4E+06	51	PT
09012100	17:08:47	-22.76	170.94	52	5.87	5.95	2.9E+12	1.9E+13	42	3.9E+07	53	AT
09012000	10:46:52	-4.63	129.87	124	5.99	5.81	4.4E+12	1.2E+13	74	1.1E+07	64	US
09011901	22:26:59	-22.9	170.61	41	5.85	5.77	2.6E+12	1.0E+13	55	1.6E+07	34	PT
09011900	03:35:24	-22.78	170.9	34	6.25	6.51	1.0E+13	1.3E+14	75	2.5E+07	54	AT
09011800	14:11:49	-30.08	-177.42	36	6.82	6.51	7.6E+13	1.3E+14	45	8.3E+08	56	AT
09011700	02:57:33	15.88	-92.54	172	5.57	5.57	1.0E+12	5.2E+12	57	5.4E+06	77	AT
09011600	19:55:26	-22.42	170.26	33	5.71	5.78	1.7E+12	1.1E+13	51	1.3E+07	55	PT
09011502	17:49:40	46.99	155.11	44	7.4	7.59	5.7E+14	5.4E+15	68	1.8E+09	131	AT
09011501	16:15:01	-10.48	161.3	83	6.25	6	1.1E+13	2.3E+13	68	3.4E+07	80	AT
09011500	07:27:25	-22.52	170.59	55	6.34	6.44	1.5E+13	1.0E+14	63	5.8E+07	65	AT
09011300	01:04:45	-14.2	66.19	33	5.72	5.51	1.7E+12	4.2E+12	44	2.0E+07	84	PT
09010901	06:54:48	-2.22	99.76	33	5.5	5.29	8.1E+11	2.0E+12	60	3.7E+06	59	PT
09010900	03:44:43	10.53	56.84	33	5.61	5.49	1.2E+12	3.8E+12	51	8.7E+06	63	PT
09010800	19:21:38	10.22	-84.28	28	6	6	4.4E+12	2.3E+13	108	3.5E+06	109	PT
09010700	03:43:09	1.68	127.33	111	6.28	6.39	1.2E+13	8.7E+13	220	1.1E+06	49	PT
09010601	22:48:33	-0.7	133.44	59	6.2	6.11	9.0E+12	3.3E+13	107	7.3E+06	31	AT
09010600	19:56:33	-1.03	132.89	39	6.02	6.12	4.9E+12	3.4E+13	167	1.0E+06	23	PT
09010501	19:24:08	-0.78	133.2	73	6.17	6.24	8.0E+12	5.2E+13	252	5.0E+05	56	PT
09010500	10:59:33	23.99	-108.67	26	5.77	5.75	2.1E+12	9.4E+12	32	6.3E+07	33	PT
09010402	23:13:01	36.6	70.88	187	6.08	5.68	5.9E+12	7.4E+12	20	7.4E+08	10	AT
09010306	22:33:45	-0.79	133.44	72	6.99	7.33	1.4E+14	2.2E+15	47	1.3E+09	70	AT
09010305	21:49:32	-0.36	132.83	35	5.94	6.05	3.6E+12	2.7E+13	52	2.6E+07	72	US
09010304	20:23:20	36.53	70.78	188	6.9	7.23	1.0E+14	1.6E+15	124	5.4E+07	60	PT
09010303	19:43:55	-0.78	132.75	17	7.2	7.45	2.9E+14	3.4E+15	49	2.4E+09	81	AT
09010302	16:49:27	-12.46	166.65	116.2	6.01	5.83	4.7E+12	1.2E+13	55	2.8E+07	62	US
09010301	16:30:48	-7.76	128.27	124	5.99	5.92	4.4E+12	1.7E+13	63	1.8E+07	63	AT